

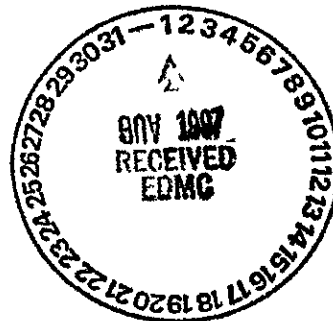
# Sampling and Analysis Instruction for Engineering Study at Waste Site 600-104, 100-IU-3 Operable Unit

Author

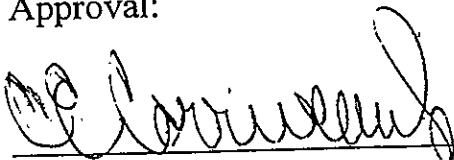
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## 1.0 INTRODUCTION

This sampling and analysis instruction has been prepared to define the sampling and analysis activities to be performed in support of an engineering study at former waste site 600-104, located within the 100-IU-3 Operable Unit. The purpose of the engineering study is to determine the nature and extent of contamination identified at the site by the U.S. Environmental Protection Agency (EPA) in May 1997. The EPA reported elevated levels of the herbicide 2,4-D and traces of 2,4,5-T at the waste site.

The following section provides background information about the project, a summary of the results from any previous investigations, a list of the contaminants of concern (COCs), and a clear definition of the study objectives.

### 1.1 BACKGROUND

The Hanford Site became a Federal facility in 1943 when the U.S. Government took possession of the land to produce nuclear materials for defense purposes. The area south of the Columbia River includes nine U. S. Department of Energy (DOE) nuclear reactors that were used for plutonium production between 1943 and 1987. In November 1989, the EPA placed the Hanford facility on the National Priorities List (NPL) because of soil and groundwater contamination that had resulted from past operation of nuclear facilities. A buffer area was defined north of the Columbia River and is known as the Wahluke Slope. The Wahluke Slope is typically referred to the "North Slope" in reports that document previous investigations and other activities in the area. For the purpose of this document the term "North Slope" will be used to refer to this area.

The North Slope is separated from the rest of the Hanford Site and all its facilities by the Columbia River (Figure 1). Plutonium production reactors or storage facilities for radioactive materials were never built in the area. Previous use of the area was for military air defense of the Hanford Site and vicinity. The North Slope contained ant-aircraft artillery and missile sites that were used for this purpose. Some localized disposal of non-Hanford materials have also been documented. As the defense requirements of Hanford changed, the artillery and missile sites were no longer needed and were deactivated in 1960-1961. The military installations were subsequently demolished in 1974.

The U.S. Fish and Wildlife Service manages the Saddle Mountain National Wildlife Refuge, which occupies the southwestern part of the North Slope. The Washington State Department of Wildlife manages the remaining portions of the North Slope north and east of the Columbia River as the Wahluke State Wildlife Recreation Area.

In 1966, a site was used to dispose of approximately 50 cubic yards of soil contaminated with 900 gallons of 2,4-D that had been removed from the area surrounding several leaking storage tanks located at a U.S. Bureau of Reclamation station in Eltopia, Washington. The leaking tanks were taken out of service, emptied, crushed, transported to the North Slope, and disposed of at the site in 1967. The disposal site was subsequently designated as 600-104 in the Environmental Sites Database (formerly known as the Waste Identification Data System - WIDS) used by DOE and its contractors to catalogue waste sites associated with Hanford. In 1989, 100-IU-3 Operable Unit was defined in the Tri-Party Agreement (TPA) and included three waste sites that were identified on the National Priorities List (NPL). One of the three waste sites was 600-104 located at the North Slope within the Wahluke State Wildlife Recreation Area.

Waste site 600-104 is located approximately 0.5 miles east of the Columbia River at the toe of a sand dune (coordinates N75000 W10000) which stands approximately 60 feet above grade of the waste site. Discussions with personnel from the U.S. Bureau of Reclamation indicated that the tanks were flattened and disposed of over the 2,4-D contaminated soil, which would indicate that the contaminated soil was buried at a depth greater than 4 feet as identified in the Environmental Sites Database. The disposal area is approximately 400 by 60 feet in size and is posted at the northern and southern ends with signs that read "2,4-D Burial Site, June 1966". The area was not used for any known 2,4-D disposal after 1967.

## **1.2 PREVIOUS INVESTIGATIONS**

Previous investigations of the North Slope area were performed during the years 1989-1990, 1992, and 1994 as documented in the following reports:

- North Slope Investigation Report (WHC-EP-0359) in April 1990,
- North Slope Expedited Response Action Proposal (DOE/RL-93-47) dated October 1993, and
- U.S. Army Corps of Engineers 2,4-D Site Report prepared for the USACE by Cascade Earth Sciences, (File PN 352059) dated August 25, 1994, stamped "DRAFT".

Information from these investigations were used to help formulate the engineering study process design documented in section 3.1 of this instruction.

The North Slope was exempted from radiological controls in October 1992 in accordance with a radiological release survey.

### 1.2.1 DOE/ERC Site Walk-Down

Following notification of exploratory activities and reported concentrations of 2500 ppm 2,4-D at the waste site by the EPA in May 1997, a walk-down was performed on May 22, 1997, by DOE representatives and staff from the Environmental Restoration Contractor (ERC). Included in the walk-down were ERC staff members that had previously worked on the North Slope Expedited Response Action (ERA) under WHC. Activities and observations from the walk-down are summarized below:

- The two "2,4-D Burial Site, June 1966" signs posted at the northern and southern ends of the site were located. USCAE had placed survey markings near each sign since the ERA activities in 1992.
- Observations of "stressed vegetation" different from that of the surrounding desert area were not identified in the burial site area other than that caused by foot traffic. This included observations standing in the area of the site and from atop (approximately 60 feet high) the sand dune on the western edge.
- The area where the flattened tanks were previously suspected to be buried was located with the aid of a magnetometer and flagged. This information was consistent with the 1992 and 1994 investigations.
- Eight auger sample locations from the 1992 investigation were located based on measurement from reference points and the presence of stakes that were used to mark location in 1992. The 8 locations were flagged.
- The "hot spot" reported by EPA to be contain elevated levels of 2,4-D at 2500 ppm and traces of 2,4,5-T was located just outside of the northeast end of the previously estimated burial site footprint approximately 10-15 feet west of the 1992 ERA sampling location #5 and 175-200 feet north of the suspected location of the flattened tanks (Figure 2). The "hot spot" included a readily noticeable gravel material approximately 12-18 inches below the surface that appeared to be different from the native sand found in the other areas and that emanated a chemical odor. The depth of the gravel material was not apparent from the existing hole in which the EPA sample was collected. The gravel material was not observed in any of the other shallow exploratory holes that were exposed from the EPA visit, nor was the material identified in any of the previous site investigations. An anthill appeared to be active at the edge of the "hot spot" hole.
- Observation of soil disturbances that would suggest recent dumping of materials were not evident at the burial site.
- A cultural/ecological resources individual identified no cultural or ecological issues with the burial site.
- Based on the crust that had developed on the surface of the sand dune, it was suggested that the dune had been inactive and had not moved in many years.

### **1.3 CONTAMINANTS OF CONCERN**

Results from the EPA samples, previous investigations, and process knowledge immediately identified 2,4-D as a primary COC and 2,4,5-T as a secondary COC. 2,4-D was used as a commercial herbicide and is one of the only herbicides that can be metabolized by bacteria, with a breakdown rate of approximately 30 days (Kathy Cramer to HCCP file, "USBR 2,4-D Burial Site", dated October 1, 1985). Additional information suggests a typical 2,4-D half-life of 9.4 to 254 days under dry conditions (Howard 1991). Process knowledge of typical 2,4-D formulations prior to the 1970s suggest that other chlorinated herbicides and dioxins should also be added as secondary COCs. The secondary COC list of chlorinated herbicides include the compounds identified below:

2,4-DB  
2,4,5-T  
2,4,5-TP  
dalapon  
dicamba  
dichlorprop  
dinoseb  
MCPA  
MCPP

In addition, volatile organic compounds and semivolatile organic compounds were commonly used as a "carrier" with 2,4-D formulations for application purposes. For this reason, these compounds are included as secondary COCs.

Radionuclides are not a COC as the North Slope was released from radiological control in October 1992.

### **1.4 SAMPLING OBJECTIVE**

An apparent "hot spot" of soil reported to be contaminated with 2500 ppm 2,4-D was recently identified at waste site 600-104. A determination of the nature and extent of the "hot spot" must be made to identify subsequent cleanup activities at waste site 600-104.

### **1.5 DECISIONS TO BE MADE**

The following section presents the decisions that need to be made to achieve the sampling objective identified in Section 1.4.

### **1.5.1 Decision Statements**

For the purpose of this engineering study, the following decision statements apply:

- S-1 Determine whether or not the gravel material located at the "hot spot" contains 2,4-D or other chlorinated herbicides, and the levels at which they are present. Determine at a selected location of high contamination whether or not dioxin, volatile organic, or semivolatile organic compounds are also present.
- S-2 Determine the aerial extent of the "hot spot".
- S-3 Determine the depth of the "hot spot".

### **1.5.2 Required Inputs for Decision Making**

The following inputs are required to respond to the decision statements identified in section 1.5.1.

- I-1 To determine whether or not the gravel material located at the "hot spot" contains 2,4-D or other chemicals, samples of the material shall be collected and analyzed for chlorinated herbicides (including 2,4-D). One or more samples shall also be selected for analysis to determine the presence of dioxins, volatile organics, and semivolatile organics.
- I-2 To determine aerial extent of the "hot spot", a hydraulic soil probe unit, hand auger, and/or a garden shovel shall be used to collect samples from progressive locations radiating from the "hot spot" area and to evaluate them based on a series of metrics described below:
  - Soil type consisting of a visual inspection for the gravel material,
  - Presence of organic vapors detected by field instruments (OVM),
  - Presence of 2,4-D detected onsite by immunoassay test kits, and
  - Confirmation by laboratory analysis of selected samples.
- I-3 To determine depth of the "hot spot" the sampling equipment shall be used to collect samples from progressive depths of the "hot spot" area and to evaluate them based on a series of metrics described in input I-2.

## **2.0 PROJECT MANAGEMENT**

The following section identifies the individuals or organizations participating in the project and discusses specific roles and responsibilities of the individuals/organizations. This section also

discusses the quality objectives for measurement data, and discusses the special training requirements for the staff performing the work.

## **2.1 PROJECT/TASK ORGANIZATION**

This engineering study shall be managed through the ERC Remedial Action and Waste Disposal Project on behalf of DOE.

- The BHI Remedial Action/Waste Disposal (RA/WD) group shall provide a task manager/project engineer.
- The CHI Remediation Processes group shall provide a field team leader.
- CHI Sampling and Characterization shall provide personnel to support field activities including onsite measurements, probing equipment operation, and sample collection, packaging, and shipping. Sampling and Characterization shall also arrange coordinate analytical services and provide data management support through the Sample Management function.
- The ERC Safety and Health group shall provide safety support.

An organization chart for this engineering study is Figure 3.

## **2.2 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA**

Onsite measurements for 2,4-D shall be performed using immunoassay test kits and confirmed by laboratory analysis. Immunoassay tests for 2,4-D shall be performed in accordance with the manufacturer test instruction provided with the kit. Laboratory samples shall also be analyzed to determine the presence and concentration of 2,4-D (and other chlorinated herbicides) in accordance with SW-846 method 8150A. Analysis for volatile organics, semivolatile organics, and dioxins shall be performed using SW-846 methods 8260A, 8270A and 8290, respectively. The target detection limits and precision and accuracy objectives for each of the analyses to be performed are summarized in Table 2-1.

**Table 1. Table Summarizing Data Quality Requirements.**

Media	Analytical Method	Analytical Parameter	Detection Limit	Precision	Accuracy
soil	SW-846/ 8150A	2,4-D	0.24 ppm	± 35%	35-125%
		2,4-DB	0.18	± 35%	
		2,4,5-T	0.04	± 35%	35-125%
		2,4,5-TP (silvex)	0.034	± 35%	35-125%
		dalapon	1.2	± 35%	
		dicamba	0.054	± 35%	
		dichlorprop	0.13	± 35%	
		dinoseb	0.014	± 35%	
		MCPA	50	± 35%	
		MCP	38	± 35%	
soil	SW-846/8260A	volatiles <sup>1</sup>	note 1	± 35%	note 1
soil	SW-846/8270A	semivolatiles <sup>2</sup>	note 2	± 35%	note 2
soil	SW-846/8290	dioxins <sup>3</sup>	note 3	± 35%	40-125%
Soil	immunoassay	2,4-D	5 ppm	± 50%	

<sup>1</sup> Analysis typically consists of over 30 target volatile organic compounds with detection limits that range from 0.005 to 0.1 ppm. Accuracy is calculated based on a representative subset of 5 target compounds with control limits that range from 60 to 140%.

<sup>2</sup> Analysis typically consists of over 65 target semivolatile organic compounds with detection limits that range from 0.66 to 4.6 ppm. Accuracy is calculated based on a representative subset of target compounds with control limits that range from 25 to 140%.

<sup>3</sup> 8290 target list and detection limits require confirmation from contract laboratory.

## 2.3 SPECIAL TRAINING REQUIREMENTS

Training or certification requirements needed by personnel are described in BHI-HR-02, *ERC Training Procedures*, and BHI-QA-03, *ERC Quality Assurance Program Plans*, Plan Numbers 5.1 and 5.2. Site workers shall have completed Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker training prior to the start of work. Personnel transporting samples from the North Slope to the 4701 sample storage facility or to local commercial laboratories shall have completed DOT shippers training.

### **3.0 MEASUREMENT/DATA ACQUISITION**

The following section presents the sampling process design, along with the requirements for sampling methods, sample handling, custody, preservation, containers, and holding times. This section also addresses the requirements for field and laboratory quality control (QC), instrument calibration and maintenance, and field documentation. Sampling and analytical support for this engineering study shall be coordinated in accordance with BHI-EE-01, procedure 2.0, Sample Event Coordination.

#### **3.1 SAMPLING PROCESS DESIGN**

Rational for the sampling process design associated with this engineering study is based on a focused objective to determine nature and extent of the reported 2,4-D "hot spot" at waste site 600-104. The process design is biased on the assumption that the "hot spot" consists of the gravel material observed at the location from which the EPA sample was collected and that presence of the material begin within approximately 2 feet of the surface. This assumption is initially supported by the following information:

- Observation that the gravel material is foreign to the native sand found at the site. This gravel material was not observed during the other investigations referenced in Section 1.2. The gravel material was also not observed in any of the May 1997 exploratory holes that were dug by EPA near the location of the "hot spot".
- Presence of a prominent chemical odor emanating from the gravel material.
- Reported concentration of 2500 ppm 2,4-D from the EPA sample collected within the exploratory hole where the gravel material was observed.

Onsite measurements of the gravel material for organic vapors and 2,4-D shall be performed using an OVM instrument and immunoassay test kits and confirmed by laboratory analysis to verify that the gravel is the source of the reported 2,4-D "hot spot". Immunoassay tests for 2,4-D shall be performed in accordance with the manufacturer test instruction provided with the kit. Laboratory samples shall also be analyzed to determine the presence and concentration of other chlorinated herbicides, volatile organics, semivolatile organics, and dioxins in accordance with the SW-846 methods listed in Table 1.

##### **3.1.1 Field Metrics**

The aerial extent and depth of the "hot spot" shall be determined using a hydraulic soil probe unit, hand auger, and/or a garden shovel to collect samples from progressive locations and depths surrounding the reported "hot spot". The general process shall consist of probing into the soil approximately 10 feet along northern (N), southern (S), eastern (E) and western (W) transects radiating from the center of the "hot spot", beginning with the center (Figure 4). The samples which are collected shall be evaluated through a series of field metrics listed below:

- Observation of soil type (inspection for the gravel material),
- Presence of organic vapors detected by field instruments (OVM), and
- Presence of 2,4-D detected onsite by immunoassay test kits.

A metal detector shall also be available at the site to explore for buried metallic objects, if needed.

At each location along the transects, samples will be collected at the surface and from within intervals of approximately 2 feet in depth. Probing, sample collection, and evaluation shall continue at each transect location until the field metrics display a negative response at two consecutive depth intervals, or until the depth limits of the sampling equipment are reached, whichever occurs first. It is anticipated that the probing depth will not exceed 16 feet.

Once the depth is determined at a transect location as described above, the sampling equipment shall be relocated approximately 10 feet outward from the "hot spot" along the same transect to a new probing location. The process of moving outward along the transects shall be repeated until the field metrics display a negative response for two consecutive aerial probing locations. When this occurs, and at the discretion and direction of the project engineer, the sampling equipment may be relocated inward along the transect at 5 foot intervals to better determine the aerial extent of the "hot spot".

If a strong correlation between physical observation of soil type, OVM readings, and test kit results is developed during the investigation process, the number of samples collected for analysis using the 2,4-D test kit may be reduced at the direction of the project engineer. Based on field observations as the probing process described above is performed, the project engineer may also select to skip an aerial or depth interval, thereby assuming a positive field metrics response. When this occurs, the process shall be continued at the next interval. An aerial or depth interval may not be skipped based on the assumption of a negative field metrics response.

Garden shovels may be used to dig exploratory holes at various locations that bisect (NE, NW, SE, SW bisects) the primary transects to quickly provide additional information on the aerial extent and depth of the "hot spot". At the discretion of the project engineer, one or more of the exploratory locations may be selected for use of the probing equipment in accordance with the process described above.

If soil or materials (other than the gravel like material) that appear to be non-native to the waste site are observed during the course of probing into the soil or digging exploratory holes, the project engineer shall be contacted for further direction.

### **3.1.2 Laboratory Analysis**

Laboratory samples shall be collected in the appropriate container for chlorinated herbicides and for dioxins at each depth and aerial interval where a negative field metrics response is observed or where the field metric response is uncertain. The field team leader, with concurrence from the project engineer, shall also direct personnel to collect laboratory samples at selected locations within the "hot spot" which are observed to be highly contaminated based on the field metrics. Field QC samples shall be collected as specified in Section 3.5. At the end of each day of field activities, all laboratory samples shall be packaged and transported under chain of custody to the 4701-C storage facility to be archived.

Within one week of the sample collection date for laboratory samples, the engineering study project team shall complete the following activities:

- Select the samples to be shipped to Quanterra for laboratory analysis,
- Select the analyses to be performed on each sample, and
- Ship the samples to Quanterra.

Selection of samples and associated analyses shall be based on review of the field metric results and observations made during the field activities. Samples submitted to Quanterra for laboratory analysis shall include representation from the areas within the extent of the "hot spot" that were found to be the most highly contaminated as well as those areas which were determined to be outside of the "hot spot" perimeter. It is anticipated that at least 7 samples will be analyzed by Quanterra for chlorinated herbicides. At least one sample will be selected from an area that is determined to be highly contaminated and submitted to Quanterra analysis of volatile organics, semivolatile organics, and dioxins in addition to chlorinated herbicides.

Results for samples which are sent to Quanterra for analysis shall be reported by the laboratory within 7 calendar days of the date of sample receipt. The data packages deliverable associated with the sample results shall be received within 15 calendar days of the delivery group closure date.

## **3.2 SAMPLING METHODS REQUIREMENTS**

Samples for this engineering study shall be collected in accordance with BHI-EE-01, *Environmental Investigation Procedures*, procedure 4.0, "Soil and Sediment Sampling".

## **3.3 SAMPLE HANDLING, SHIPPING, AND CUSTODY REQUIREMENTS**

Sample handling, shipping, and custody shall be performed in accordance with BHI-EE-01, Procedure 3.1, "Sample Packaging and Shipping"; Procedure 3.0, "Chain of Custody"; and Procedure 4.2, "Sample Storage and Shipping Facility."

### 3.4 SAMPLE PRESERVATION, CONTAINERS, AND HOLDING TIMES

The sample preservation, container, and holding time requirements for the laboratory analyses to be performed are summarized in Table 3-1.

**Table 2. Preservatives, Containers, and Holding Times.**

Matrix	Analyte/Test	Container	Size	Preservative	Holding Time
soil	SW-846/8150A chlorinated herbicides	amber glass	120 g	none	14/40 days <sup>1</sup>
soil	SW-846/8260A	amber glass	20 g	none	14 days
soil	SW-846/8270A	amber glass	120 g	none	14/40 days <sup>1</sup>
soil	SW-846/8290 dioxins	amber glass	40 g	none	14/40 days <sup>1</sup>

<sup>1</sup>Samples must be extracted within 14 days of sample collection, and analyzed within 40 days of the extraction date.

Samples which are collected for 8150A, 8270A, and 8290 may be collected in one container if desired. Onsite analysis of 2,4-D using immunoassay tests kits require approximately 20 g of soil which will be collected in an amber glass bottle and analyzed immediately.

### 3.5 QUALITY CONTROL REQUIREMENTS

Quality Control (QC) measures shall be followed in the field and laboratory to ensure that reliable data are obtained. When performing this field sampling effort, care shall be taken to prevent the cross-contamination of sampling equipment, sample bottles, and other equipment that could compromise sample integrity.

#### 3.5.1 Field QC

Field QC samples to be collected as part of this engineering study include "local background" and field duplicate samples as described below:

- Local Background samples shall be collected from a minimum of two locations and submitted to the laboratory for analysis to provide a general baseline of COC levels. Location of the local background samples shall be determined by the field team leader. Local background samples shall be collected in duplicate and also submitted to the onsite measurement personnel for 2,4-D analysis by immunoassay test kits.

- Field Duplicate samples provide an indication of field and analytical system precision. As a minimum, one field duplicate sample shall be collected and submitted to the laboratory for analysis on each day of sampling activity, or 1 per 20 laboratory samples, whichever is most frequent. For purposes of this study, field duplicates shall be collected in "triplicate" and also submitted to the onsite measurement personnel for 2,4-D analysis by immunoassay test kits. Location of duplicate samples shall be determined by the field team leader. NOTE: If other agencies are present at the site and wish collect samples for analysis by their own selected laboratories, activities should be coordinated to collect field duplicate samples at those sample locations.

### 3.5.2 Onsite Measurements QC

QC samples prepared and analyzed for onsite measurements include duplicates as described below:

- Duplicates are typically used as an indication of precision associated with the analytical process by calculating the relative percent difference (RPD) between two results. At least one onsite measurements duplicate shall be prepared and analyzed each day of testing.

### 3.5.3 Laboratory QC

QC samples prepared and analyzed by the laboratory include blanks, duplicates, and spikes as described below:

- laboratory Method Blanks provide an indication of potential contamination introduced in the laboratory during sample preparation and analysis. Laboratory method blanks shall be prepared and analyzed at a frequency of 1 per 20 samples or 1 per each delivery group, whichever is most frequent.
- Duplicates are typically used as an indication of precision associated with the analytical process by calculating RPD between two results. As a minimum, a duplicate sample shall be prepared by the laboratory and analyzed at a frequency of 1 per 20 samples or 1 per each delivery group, whichever is most frequent.
- Spikes provide an indication of preparation and analysis method accuracy through addition of a known amount of material to a sample (matrix spike) or blank (laboratory control sample - LCS) and calculation of percent recovery. As a minimum, a spiked sample shall be prepared and analyzed at a frequency of 1 per 20 samples or 1 per each delivery group, whichever is most frequent.

### **3.6 INSTRUMENT CALIBRATION AND MAINTENANCE**

All field screening and analytical instruments shall be calibrated and maintained in accordance BHI-QA-03, Procedure 5.2, "Onsite Measurements Quality Assurance Program", and the manufacturer test instructions. The results from all instrument calibration and maintenance activities shall be recorded in a bound logbook in accordance with procedures outlined in BHI-EE-01, Procedure 1.5, "Field Logbooks."

### **3.7 FIELD DOCUMENTATION**

Field documentation shall be kept in accordance with BHI-EE-01, *Environmental Investigation Procedures*, including the following procedures:

- Procedure 1.5, "Field Logbooks"
- Procedure 1.13, "Environmental Site Identification and Information Reporting"
- Procedure 3.0, "Chain of Custody."

## **4.0 ASSESSMENTS AND RESPONSE ACTIONS**

The Compliance and Quality Programs Group may conduct random surveillance and assessments in accordance with BHI-MA-02, Procedure 5.3, "Self-Assessments," to verify compliance with the requirements outlined in this sampling and analysis instruction, project work packages, the Bechtel Hanford, Inc. (BHI) Quality Management Plan, and BHI procedures and regulatory requirements.

Deficiencies identified by assessment activities shall be reported in accordance with BHI-MA-02, Procedure 5.3, "Self-Assessments." When appropriate, corrective actions will be initiated by the Project Engineer in accordance with HASQARD, Volume 1, Section 4.0 (DOE 1996) to minimize recurrence.

## **5.0 DATA VERIFICATION AND VALIDATION REQUIREMENTS**

Sample data shall be verified to ensure that analyses were performed and reported as requested. Data validation is not required as part of this engineering study.

## 6.0 MANAGEMENT OF INVESTIGATION DERIVED WASTE

Investigation derived waste generated by characterization activities will be managed in accordance with BHI-EE-10, *Waste Management Plan*. Waste generated in the field shall be collected in the satellite accumulation area of the onsite measurements mobile testing unit and coordinated through Field Services Waste Management (FSWM) for appropriate designation and disposal. The following waste streams are anticipated:

- Liquid waste consisting of 2,4-D test kit reagents (acids), standards, rinsewater, and sample extracts shall be collected in plastic jugs.
- Solid waste consisting of sample tubes/sleeves, extraction vials, test tubes, pipet tips, spatulas paper towels, protective gloves, etc. shall be collected in trash bags.
- Unused samples and contaminated drill cuttings shall be collected in glass, metal, or plastic containers of appropriate size.

A liquid decontamination process is not anticipated for this study.

Unused samples and associated laboratory waste for the analysis performed by Quanterra will be dispositioned in accordance with the laboratory purchase order and agreements for sample return to the Hanford site.

## 7.0 HEALTH AND SAFETY

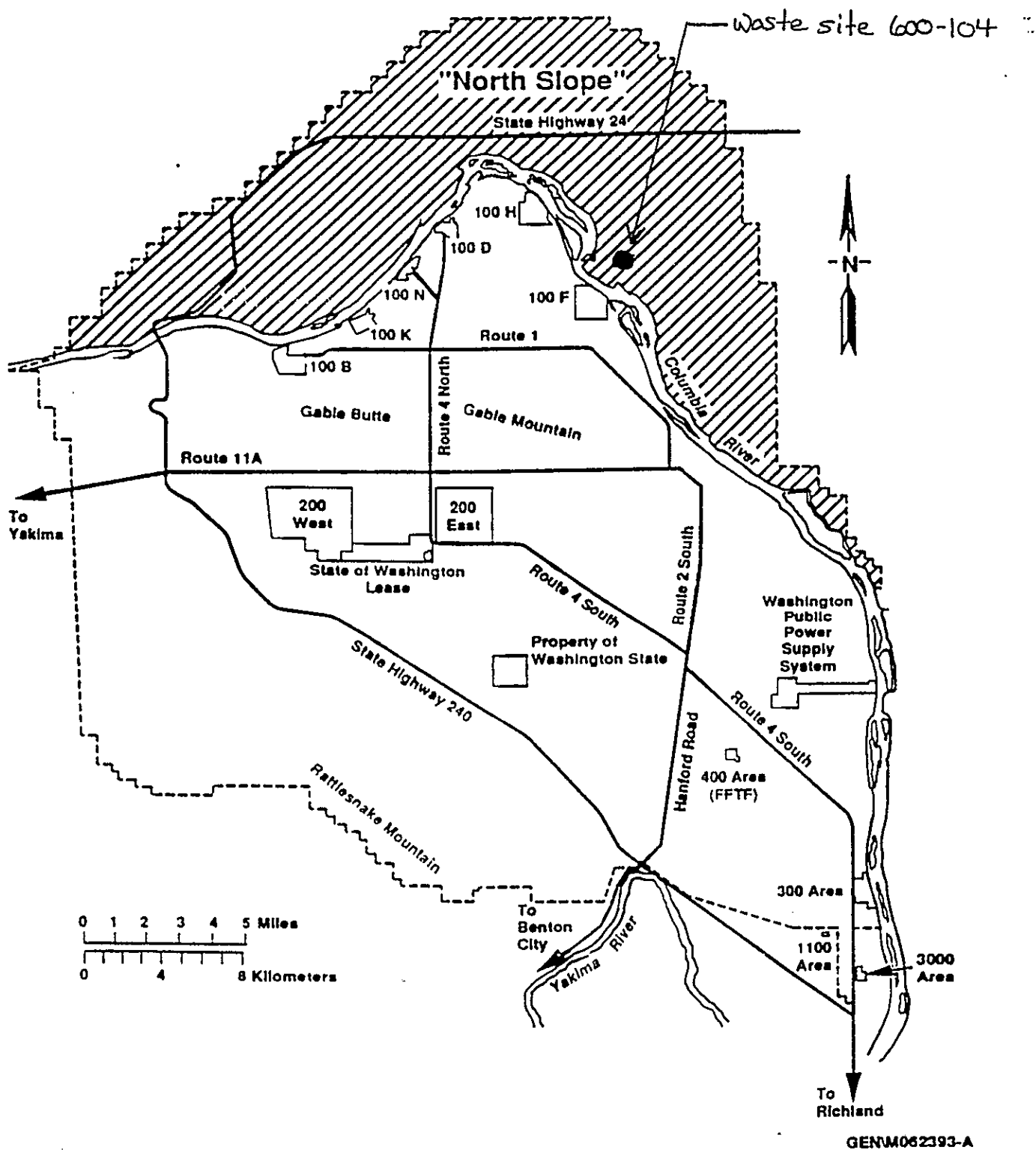
All field operations will be performed in accordance with BHI health and safety requirements outlined in BHI-SH-01, *Hanford ERC Environmental, Safety, and Health Program*. In addition, a site-specific health and safety plan shall be prepared in accordance with BHI-MA-02, *ERC Project Procedures*. The site-specific plan shall include an activity hazard analysis and define the required control measures for the engineering study.

Exposure to radiation not a health and safety issue for this engineering study as the North Slope was released from radiological control in 1992.

## 8.0 REFERENCES

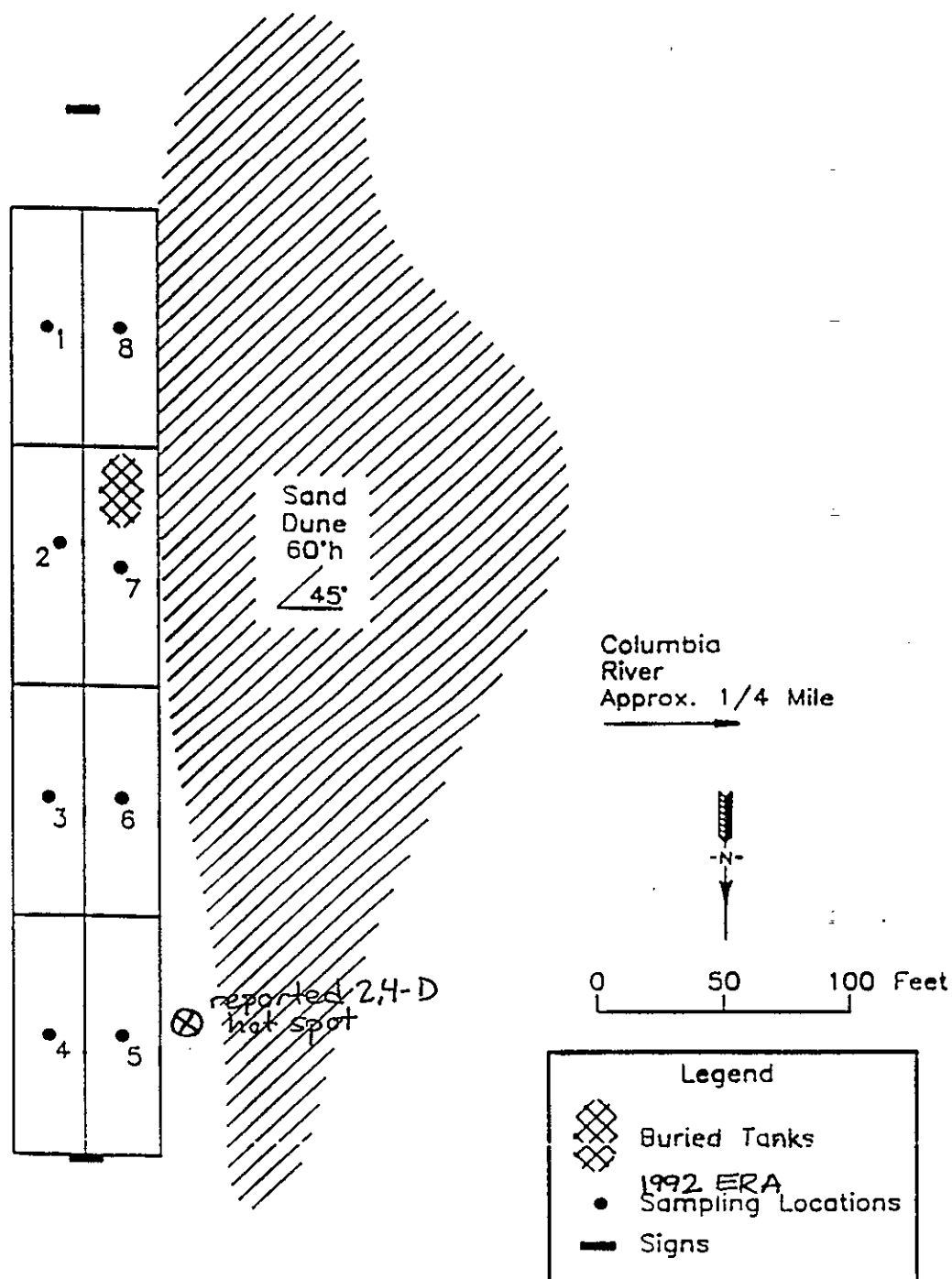
- BHI-EE-01, *Environmental Investigations Procedures*, Bechtel Hanford, Inc., Richland, Washington.
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Figure 1. Location of the Hanford Site North Slope.



GENW062393-A

Figure 2. Reported 2,4-D Hot Spot Location



GEN 041693-A  
 ⊗ EPA reported 2,4-D Hot Spot (1997)

Figure 3. Organization Chart

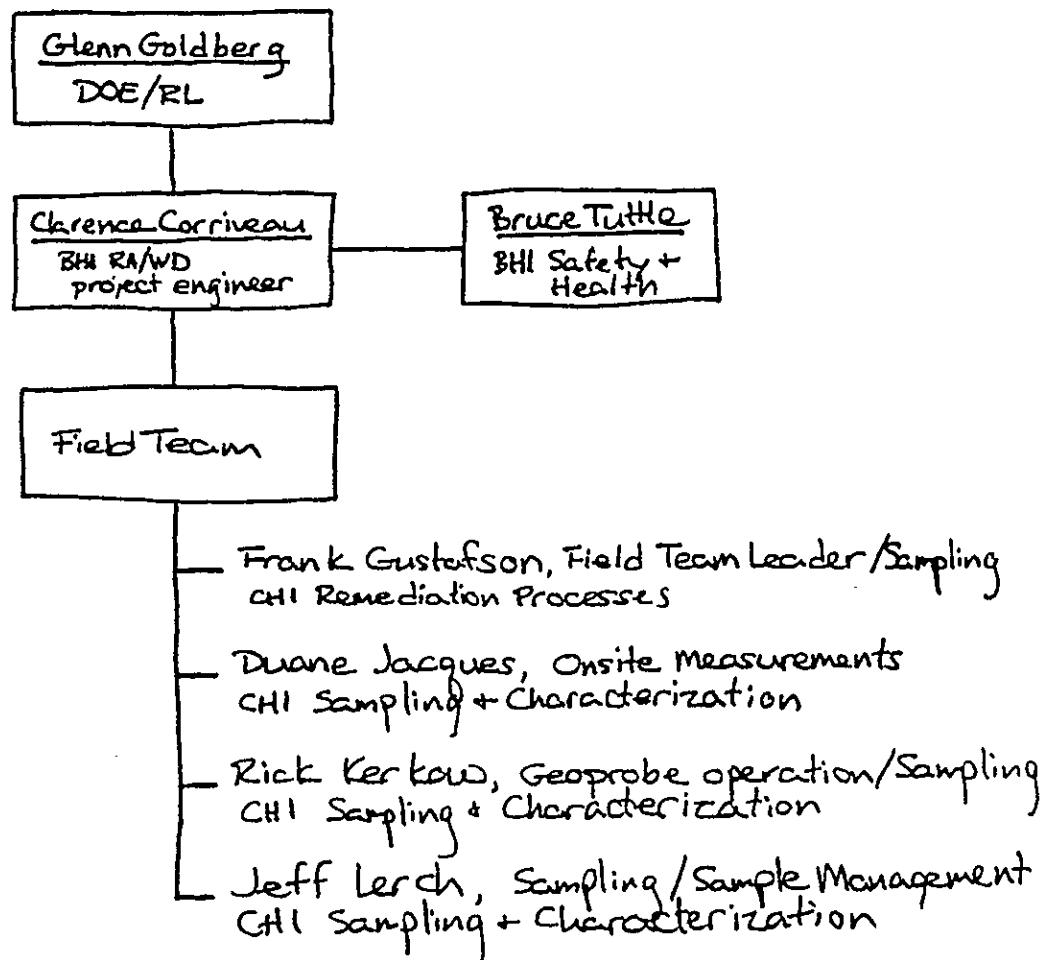


Figure 4. General Site Layout for 600-104 Engineering Study

